

CLAIMS

1. A gyroscope with a vibrating structure, produced by micromachining a thin flat wafer, this gyroscope comprising two symmetrical moving assemblies (30, 50; 30', 50') coupled by a coupling structure (20, 20', 22) that connects these two assemblies in order to allow mechanical vibration energy to be transferred between them, this gyroscope being characterized in that each of the two symmetrical moving assemblies comprises two moving elements (30, 50), an inertial first moving element (50) being connected to the coupling structure (20, 20', 22) and able to vibrate in two degrees of freedom in orthogonal directions Ox and Oy of the plane of the wafer, and a second moving element (30) being connected, on one side, to the first element (50) and, on the other side, to fixed anchoring regions (34, 36) via linking means (40-46; 52-58) that allow the vibration movement of the first element in the Oy direction to be transmitted to the second element without permitting any movement of the second element in the Ox direction, an excitation structure (70) being associated with the first moving element (50) in order to excite a vibration of the first element along Ox, and a movement detection structure (90) being associated with the second moving element (30) in order to detect a vibration of the second element along Oy, the first moving element (50) being a rectangular intermediate frame surrounding the second moving element, denoted by the name moving mass (30), and the coupling structure comprising two outer frames (20), each of which surrounds the intermediate frame of a respective moving assembly.
2. The gyroscope as claimed in claim 1, characterized in that the moving mass (30) is connected to the intermediate frame (50) via at least two first narrow and elongate flexure arms (52-58) that exhibit high resistance to elongation in the Oy direction and low

stiffness in the O_x direction, and the moving mass is connected to at least one anchoring region via at least two second narrow and elongate flexure arms that exhibit high resistance to elongation in the O_x direction and low stiffness in the O_y direction.

3. The gyroscope as claimed in claim 2, characterized in that each first flexure arm is bent over in the form of a U and has two elongate portions extending along the O_y direction, these two portions being connected by a short linking element.

4. The gyroscope as claimed in claim 3, characterized in that the short linking element of one of the first arms (52) is connected to the similar linking element of another first arm (54) via a crosspiece (60) elongated in the O_x direction.

5. The gyroscope as claimed in one of claims 1 to 4, characterized in that the coupling structure (20, 20', 22) is connected to the first moving element of each assembly via short rigid links (64, 66).

6. The gyroscope as claimed in one of claims 1 to 5, characterized in that the coupling structure comprises, around each moving assembly, an outer frame (20, 20') and a short linking bar (22) between the outer frames.

7. The gyroscope as claimed in one of claims 1 to 6, characterized in that the structure for exciting the first moving element is a capacitive comb with interdigitated electrodes, which is machined in the thin flat wafer.

8. The gyroscope as claimed in one of claims 1 to 7, characterized in that the structure for detecting movement of the second moving element is a capacitive comb with interdigitated electrodes, which is machined in the thin flat wafer.

9. The gyroscope as claimed in one of claims 1 to 6, characterized in that it includes at least one interdigitated comb (90) associated with the second moving element (30) of each assembly, for detecting the movement of the latter along Oy, and at least one additional interdigitated comb (110), electrically separated from the first, for exerting, on the second moving element, by applying an adjustable voltage to this additional comb, an adjustable force allowing the natural resonant frequency of the moving assembly to be modified.

10. The gyroscope as claimed in one of claims 1 to 6, characterized in that it includes at least one interdigitated comb (90) associated with the second moving element (30) of each assembly, for detecting the movement of the latter along Oy, and at least one additional interdigitated comb (130, 140) associated with the second moving element (30) of each assembly, in order to exert, by applying an adjustable voltage to this additional comb, an adjustable torque on the second moving element about an axis Oz perpendicular to Ox and Oy.

11. The gyroscope as claimed in one of claims 1 to 6, characterized in that it includes at least three interdigitated combs associated with the second moving element, the first one (90, 100) for detecting the movement of the second moving assembly along Oy, the second one (110, 120) for adjusting the detection frequency and the third one (130, 140) for exerting an adjustable torque on the second moving element.